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CONFIDENTIAL

SET A

UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION

SEPTEMBER 2013 SESSION

SUBJECT CODE	:	**FKD 22302**
SUBJECT TITLE	:	**MATHEMATICS FOR TECHNOLOGIST 3**
LEVEL	:	**DIPLOMA**
TIME / DURATION	:	**(2 HOURS)**
DATE	:	

INSTRUCTIONS TO CANDIDATES

1. **Please read the instructions given in the question paper CAREFULLY.**
2. **This question paper is printed on both sides of the paper.**
3. **Please write your answers on the answer booklet provided.**
4. **Answer should be written in blue or black ink except for sketching, graphic and illustration.**
5. **This question paper consists of TWO (2) sections. Section A and B. Answer all questions in Section A. For Section B, answer two (2) question only.**
6. **Answer all questions in English.**
7. **Graph paper and Calculus formula are appended.**

THERE ARE 6 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION (Total: 30 marks)

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

Question 1

Given that $z = x^2y + 4y^3 + 3$. Determine the following:

a) $\frac{\partial z}{\partial x}$ and $\frac{\partial^2 z}{\partial y \partial x}$.

[2 marks]

b) $\frac{\partial z}{\partial y}$ and $\frac{\partial^2 z}{\partial x \partial y}$.

[2 marks]

c) Hence, show that $\frac{\partial^2 z}{\partial y \partial x} - \frac{\partial^2 z}{\partial x \partial y} = 0$.

[1 mark]

Question 2

a) Solve $\int_{-1}^{3}\int_{-1}^{2}\int_{0}^{1}(x - y + 2z)\, dx\, dy\, dz$.

[4 marks]

b) Evaluate $\int_{1}^{2}\int_{0}^{1}(e^{2\theta + r})\, d\theta\, dr$.

[3 marks]

Question 3

Given $\underset{\sim}{p} = 2\underset{\sim}{i} + 4\underset{\sim}{j}$ and $\underset{\sim}{q} = 3\underset{\sim}{i} + \underset{\sim}{j}$.

a) Determine $3\underset{\sim}{p} - 8\underset{\sim}{q}$.

[2 marks]

b) Let point $A(2,-4)$ and point $B(7,6)$. If $\overrightarrow{AB} = h\underset{\sim}{p} + k\underset{\sim}{q}$ where h and k are constants, find the values of h and k.

[4 marks]

Question 4

TABLE 1 shows the number of different sizes of shoes sold by En. Razak within a certain week.

Shoes size	4	5	6	7	8	9
Frequency	5	6	9	3	4	2

TABLE 1

Determine the

a) Mean (leaving your answer to the nearest integer).

[1 mark]

b) Mode.

[1 mark]

c) Variance of the data set.

Hint: $s^2 = \dfrac{\sum\left(x_i - \bar{x}\right)^2}{n-1}$ [3 marks]

d) Standard deviation of the data set.

[1 mark]

Question 5

A die is tossed 1 time.

a) Write down the sample space S and $n(S)$ of the above experiment.

[2 marks]

b) Determine the probability that the number that appears is a prime number.

[1 mark]

c) The same die is tossed two times in a row. Determine the probability of getting number 6.

[3 marks]

SECTION B(Total: 20 marks)

INSTRUCTION: Answer TWO questions.

Please use the answer booklet provided.

Question 1

Given points $A(1,2,-1)$, $B(-1,1,3)$ and $C(-8,1,3)$.

a) Determine $\overrightarrow{BA}$, $\overrightarrow{BC}$ and $\overrightarrow{AC}$ in the form $a\underset{\sim}{i}+b\underset{\sim}{j}+c\underset{\sim}{k}$.

[3 marks]

b) Calculate the cosine of the angle between $\overrightarrow{BA}$ and $\overrightarrow{BC}$. ***(Hint: use cosines law)***

[4 marks]

c) Prove that $(\overrightarrow{OA}\times\overrightarrow{OB})\bullet\overrightarrow{OC}=(\overrightarrow{OB}\times\overrightarrow{OC})\bullet\overrightarrow{OA}$

[3 marks]

Question 2

For Question 2(a), Attach APPENDIX 1 with the answer booklet provided.

A machine is set to produce bolts of nominal diameter 25.0mm. Measurement of the diameters of 60 bolts gave the following frequency distribution as shown in TABLE 2.

Diameter $x(mm)$	23.3-23.7	23.8-24.2	24.3-24.7	24.8-25.2	25.3-25.7	25.8-26.2	26.3-26.7
Frequency (f)	4	2	10	16	17	3	8

TABLE 2

a) Complete the cumulative frequency distribution table given in **APPENDIX 1**.

[4 marks]

b) Draw an **Ogive** to represent the data set.

[3 marks]

c) Based on your graph, determine

i. the median of the diameter

[1 mark]

ii. the percentage of bolts produce with diameters less than 24.65mm

[2 marks]

Question 3

Probability that it will rain on a particular morning was $\frac{1}{5}$. If it rains, the probability of Aliff taking a taxi to UniKL MFI is $\frac{5}{6}$. If it does not rain, Aliff will be going to UniKL MFI by riding his motorcycle. For 80% of total days Aliff will not take a taxi to the UniKL MFI, he came early.

On a particular morning:

a) What is the probability that Aliff will not take a taxi to UniKL MFI?

[2 marks]

b) What is the probability that Aliff will not take a taxi to UniKL MFI and arrive late at

UniKL MFI?

[2 marks]

c) What is the probability that Aliff will not take a taxi and arrive early at UniKL MFI?

[2 marks]

d) What is the probability that Aliff will not ride his motorcycle to UniKL MFI?

[2 marks]

e) What is the probability that if not rain and Aliff arrive late at UniKL MF?

[2 marks]

END OF QUESTION

APPENDIX 1

Question 2(a) Section B
INSTRUCTIONS: Fill in the blanks.

Name:

ID no:

Group:

Frequency Distribution Table

Diameter $x(mm)$	**Class Boundary**	**Frequency(f)**	**Cumulative Frequency**
23.3-23.7			
23.8-24.2			
24.3-24.7			
24.8-25.2			
25.3-25.7			
25.8-26.2			
26.3-26.7			

Table of Differentiation

Trigonometric Functions – GENERAL FORM
$\frac{d}{dx}(\sin f(x)) = \cos f(x) \times f'(x)$
$\frac{d}{dx}(\cos f(x)) = -\sin f(x) \times f'(x)$
$\frac{d}{dx}(\tan f(x)) = \sec^2 f(x) \times f'(x)$
$\frac{d}{dx}(\csc f(x)) = -\csc f(x)\cot f(x) \times f'(x)$
$\frac{d}{dx}(\sec f(x)) = \sec f(x)\tan f(x) \times f'(x)$
$\frac{d}{dx}(\cot f(x)) = -\csc^2 f(x) \times f'(x)$

Exponential Function – GENERAL FORM
$\frac{d}{dx}\left(e^{f(x)}\right) = e^{f(x)} \times f'(x)$

Logarithmic Function – GENERAL FORM
$\frac{d}{dx}(\ln f(x)) = \frac{f'(x)}{f(x)}$

Table of Integration

Trigonometric Functions – GENERAL FORM Where : $f(x) = ax + b$
$\int \cos f(x)dx = \frac{\sin f(x)}{f'(x)} + C$
$\int \sin f(x)dx = \frac{-\cos f(x)}{f'(x)} + C$
$\int \sec^2 f(x)dx = \frac{\tan f(x)}{f'(x)} + C$

$\int \sec f(x)\tan f(x)dx = \frac{\sec f(x)}{f'(x)} + C$
$\int \csc f(x)\cot f(x)dx = \frac{-\csc f(x)}{f'(x)} + C$
$\int \csc^2 f(x)dx = \frac{-\cot f(x)}{f'(x)} + C$

Exponential Function – GENERAL FORM Where : $f(x) = ax + b$
$\int e^{f(x)}\,dx = \frac{e^{f(x)}}{f'(x)} + C$

Logarithmic Function – GENERAL FORM Where : $f(x) = ax + b$
$\int \frac{1}{f(x)}dx = \frac{\ln\lvert f(x)\rvert}{f'(x)} + C$